Rejections Under 35 U.S.C. §102

Claims 1, 5, 7-11 and 14 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,647,813 to Guha et al. A proper rejection of a claim under 35 U.S.C. §102 requires that a single prior art reference disclose each element of the claim. See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983).

It is alleged in the Office Action that:

> Regarding claim 1, Guha discloses an organic light emitting device comprising an electrode (74 of Fig 7) a current self limiting structure (ZnSe/Ca stack, 78, lines 39-40 of column 4) and an organic stack (76) located between the electrode (74) and the current self limiting structure (78, see Fig 7)
>
> Regarding claim 5, Guha discloses that the current self-limiting structure comprises an anisotropically conductive material (lines 39-40 of column 40).
>
> Regarding claim 7, Guha discloses that the current self-limiting structure resides between the electrode (74 of Fig 7) and a conducting layer (80 of Fig 7).
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> Regarding claim 8, Guha discloses that the conducting layer (80 of Fig 7) is embedded within the current self-limiting structure (78, see Fig 7).
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> Regarding claim 9, Guha discloses that the conducting layer (80 of Fig 7) resides over the current self-limiting structure (78, see Fig 7).
>
> Regarding claim 10, Guha discloses an organic light emitting device which increases the reliability of the device (lines 15-17 of column 5) comprising the steps of forming an organic light emitting device (70 of Fig 7) and incorporating a current self limiting structure (78 of Fig 7) within the organic light emitting device (70).
>
> Regarding claim 11, Guha discloses that the current self-limiting structure is formed in contact with an electrode (80 of Fig 7).
>
> Regarding claim 14, Guha discloses that the self limiting structure (78 of Fig 7) comprises an anisotropically conductive material (lines 39-40 of column 40).

Guha et al. appears to disclose an organic light emitting diode (OLED) having a transparent cathode structure. The cathode structure includes a low work function metal, such as calcium (Ca), in direct contact with the electron transport layer of the OLED. The low work function metal is covered by a layer of a wide bandgap semiconductor, such as ZnSe. The wide bandgap semiconductor protects both the organic films and the low work

function metal film during subsequent deposition of other materials such as indium tin oxide (ITO), which can be added to increase lateral conductivity (See Abstract and column 1, lines 58-66.) The OLED disclosed by Guha et al. appears to include a transparent cathode so that the entire OLED device is transparent, thus providing a display, for example a heads up display. The structure disclosed by Guha et al. includes an organic stack located between an anode and the cathode. The formation of the ZnSe film results in a columnar microstructure having a very high resistivity parallel to the thin film surface and high conductivity in a direction perpendicular to the film surface, thus indicating the poor lateral conductivity of ZnSe and the superior conductivity of ZnSe in the direction perpendicular to the thin film surface. (See column 4, lines 20-24.) Essentially, the ZnSe film exhibits high conductivity in a direction perpendicular to the film surface, thus providing a good current injector with low series resistance. (See column 4, lines 62-63.) Indeed, the ZnSe film exhibits no current limiting capabilities whatsoever. The ZnSe also maintains a mechanically and chemically undamaged ZnSe/OLED interface. (See column 4, line 63-64.)

Because the ZnSe exhibits poor lateral current transport characteristics, the ZnSe film is covered with an additional semi-transparent layer of aluminum (Al), which exhibits high lateral current conductivity. In this manner, the high lateral conductivity of the Al, combined with the high perpendicular current conductivity of the ZnSe results in brightly lit diodes with light emission beginning at only 3 volts. (See column 4, lines 35-38). Further, when the ZnSe film is covered with a layer of Al, any short in the organic stack will cause the entire stack to short because of the high lateral conductivity of the Al and the high perpendicular conductivity of the ZnSe.

It is apparent from the above discussion that the OLED of Guha et al. includes a two layer cathode in which the ZnSe layer provides superior perpendicular current injection, and in which the cathode is covered by an additional conductive layer (Al), which provides superior

lateral current injection. Indeed, as illustrated in Figure 6 of Guha et al., the combination of the ZnSe layer and the ITO layer provides both perpendicular and lateral current transport having no current limiting characteristics. In addition, the Ca layer below the ZnSe film ensures that any short in the organic stack will be connected to the whole of the ZnSe layer.

In marked contrast to Guha et al., the present invention is an organic light emitting device having a current self-limiting structure disposed between an electrode and the organic stack. The purpose of the current self-limiting structure is to prevent current flow between the two electrodes of the device if a short occurs in the organic stack. In contrast to the structure illustrated in Guha et al., the current self-limiting structure of the invention prevents excess current flow if a short occurs in the organic stack. The structure disclosed by Guha et al. ensures that current will flow both perpendicularly (through the low work function metal and into the organic stack) and laterally (across the surface of the organic stack).

With respect to the statement in the Office Action that "[r]egarding claim 1, Guha discloses an organic light emitting device comprising an electrode (74 of Fig 7) a current self limiting structure (ZnSe/Ca stack, 78, lines 39-40 of column 4)", Applicants respectfully submit that the ZnSe/Ca stack, 78 of Guha et al. is not a current self-limiting structure as claimed in the invention. Instead, the ZnSe/Ca stack, 78 of Guha et al. is merely a transparent cathode that provides perpendicular current transport as illustrated in Figs. 6 and 7 and as mentioned in column 5, line 33 of Guha et al. Furthermore, column 4, line 39-40 of Guha et al. merely mentions that the ZnSe layer is an isotropic conductor, and not that the ZnSe layer is a current self-limiting structure, as alleged in the Office Action. Indeed, in contrast to the invention, the ZnSe/Ca stack, 78 of Guha et al. facilitates the perpendicular injection of current into the organic stack and in no way limits the flow of current. Further, Guha et al. fails to disclose, teach or suggest any explicit or inherent current limiting structure.

With particular regard to the claims, independent claim 1 includes the feature of a "current self-limiting structure" and independent claim 10 includes the step of "incorporating a current self-limiting structure within said organic light emitting device." Applicants respectfully submit that a "current self-limiting structure" is neither disclosed, taught, nor suggested by Guha et al. Further, Applicants respectfully submit that there is no teaching in the prior art to suggest that the ZnSe film exhibits any current limiting characteristics at all.

With respect to claim 5, Applicants respectfully disagree with the statement in the Office Action that "Guha discloses that the current self-limiting structure comprises an isotropically conductive material (line 39-40 of column 40)" because, as mentioned above, Applicants respectfully submit that Guha et al. fails to disclose a current self-limiting structure, and instead discloses merely a cathode having a layer of ZnSe covered by an additional layer of Al, which provides superior lateral current transport.

With respect to claim 7, Applicants respectfully disagree with the statement in the Office Action that "Guha discloses that the current self-limiting structure resides between the electrode (74 of Fig 7) and a conducting layer (80 of Fig 7)." As mentioned above, Applicants respectfully submit that, because Guha et al. fails to disclose, teach or suggest a current self-limiting structure, it is impossible for Guha et al. to disclose a current self-limiting structure between the electrode 74 and the conducting layer 80.

With respect to claims 8 and 9, Applicants respectfully submit that Guha et al. fails to disclose, teach or suggest a current self-limiting structure.

With respect to claims 11 and 14, Applicants respectfully submit that Guha et al. fails to disclose, teach or suggest the current self-limiting structure.

Accordingly, Applicants respectfully submit that independent claims 1 and 10 are allowable in that they recite features and steps that are neither disclosed, taught nor suggested by Guha et al. Furthermore, Applicants respectfully submit that dependent claims 2-9 and 11-

14 are allowable for at least the reason that they depend either directly or indirectly from allowable independent claims. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988).

Rejections Under 35 U.S.C. §103

Claims 2-4 and 12-13 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Guha et al. and further in view of U.S. Patent No. 5,721,562 to Kawashima et al. In order for a claim to be properly rejected under 35 U.S.C. §103, the combined teachings of the prior art references must suggest all features of the claimed invention to one of ordinary skill in the art. See, e.g., In Re Dow Chemical, 837, F.2d 469, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988); In re Keller, 642 F.2d 413, 208 U.S.P.Q. 871, 881 (C.C.P.A. 1981). In addition, "[t]he PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." *In re Fine, supra.*

It is alleged in the Office Action that:

> Claims 2-4 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guha et al.(US 5739545) as applied to claim 1 above, and further in view of Kawashima et al.(US 5721562).
>
> Regarding claim 2, Guha meets all the limitations of claim 2 except for the fact that the self limiting structure resides in contact with the electrode (74 of Fig 7).
>
> However, Kawasaki discloses a current limiting structure (insulating films having columnar crystal structure, 3a of Fig 2) resides in contact with electrode (2,6), this renders low voltage requirement for the display device (26-31 Of column 2).
>
> Thus, it would have been obvious to one having ordinary skill in the art to have the current limiting structure of Guha residing in contact with the electrode, since this will have the advantage of obtaining a low voltage display device.
>
> Regarding claim 3, kawasaki discloses that the current self limiting structure (3a of Fig 1) is applied as patterned lattice structure over the electrode (2 of Fig 1). The same reason for combining art as in claim 2 applies here.

> Regarding claim 4, Kawasaki discloses that the current self-limiting structure (3a of Fig 1) applies over the electrode (2) as a grid defining windows in which the electrodes are applied. The same reason for combing art as in claim 2 applies.
>
> Claim 12 recites essentially the same limitations of claim 3. So claim 12 is rejected as claim 3 (see rejection of clam 3).
>
> Claim 13 recites essentially the same limitations of claim 4. So claim 13 is rejected as claim 4 (see rejection of claim 4).

Kawashima et al. appears to disclose an electroluminescent display device including a columnar crystal structure insulating film located between the electrodes of the device and the light-emitting portion of the device.

Applicants respectfully submit that, for the reasons stated with respect to claims 1 and 10, the proposed combination fails to disclose, teach or suggest each element of the claimed invention. Specifically, the proposed combination fails to disclose, teach or suggest a current self-limiting structure.

Accordingly, Applicants respectfully submit that claims 2-4 and 12-13 are allowable over the combination of Guha et al. and Kawashima et al., and furthermore, that dependent claims 2-4 and 12-13 are allowable for at least the reason that they depend from allowable independent claims. *In re Fine, supra.*

Allowable Subject Matter

Applicants wish to thank the Examiner for the indicated allowability of dependent claim 6. However, Applicants have not yet amended independent claim 1 to include the features of claim 6.

CONCLUSION

For at least the foregoing reasons, Applicants respectfully request that all outstanding rejections be withdrawn and that all pending claims of this application be allowed to issue. If the Examiner has any comments regarding Applicants' response or intends to dispose of this matter in a manner other than a notice of allowance, Applicants request that the Examiner telephone Applicants' undersigned attorney.

Respectfully submitted,

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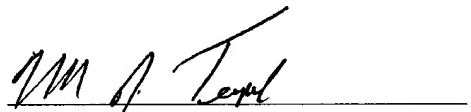
By: 

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